REMARKS

I. Introduction

After entry of the present Amendment, claims 1-23 are pending in the application. Claims 1-10 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over US 3,162,536 ("Kaufmann") in view of Bowes & Church's Food Values Of Portions Commonly Used ("Bowes"). Claims 11 and 13-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kaufmann in view of Bowes and further in view of an English translation of EP 0 084 831 ("Flessner").

As discussed in detail below, Applicants believe the Examiner misunderstands the fundamental differences between the form of protein in potato flour and the form of protein in wheat flour, and the effect these different proteins have on the formed product. Due to such fundamental differences, one of ordinary skill[1] would not expect potato flour to provide anything close to a texturally firm pasta (after cooking) without the additional use of texture enhancing agents and, therefore, also not expect potato flour and wheat flour to be simple substitutes for each other. In addition, the prior art of record (*see, e.g.*, Marconi et al.) also shows that a high temperature drying profile has little or no effect on the texture (after cooking) of soft-wheat-like pasta.

Applicants, on the other hand, have discovered a method that does not use significant amounts of texture enhancing additives and includes, among other steps, certain drying profiles effective to form low-protein wheat flour dough into pasta exhibiting a textural firmness (after cooking) that previously could only be obtained using high quality hard wheat/Semolina flour or low protein flours combined with

[1] *See, e.g.*, US 4,517,215 and US 5,087,470.

textural enhancing agents. These drying profiles include the combined effect of certain temperature ranges and certain relative humidity ranges.

In light of the cited prior art, Applicants results are clearly unexpected, and the Office Action has provided no reasoned explanation why one of ordinary skill would have modified both drying temperature and drying humidity ranges to form a low-protein flour dough (without texture enhancing agents) into a pasta having the desired textural firmness (after cooking) when the cited prior art teaches exactly the opposite. The art of record is either fundamentally off-point (*i.e.*, potato protein vs. wheat protein), teaches away by disclosing the opposite effect of drying temperature (*i.e.*, little or no improvement in texture), or teaches away by specifically requiring texture enhancing agents to achieve the desired firmness. Applicants request reconsideration and allowance in light of the discussion herein.

II. One Of Ordinary Skill At The Time Of Applicants' Invention Would Not Expect Potato Flour To Form Texturally Firm Pasta Without Texture Enhancing Agents

According to US 4,517,215 and US 5,087,470[2], one of ordinary skill in the art at the time of the Applicants invention, would not expect potato flour to form texturally firm pasta due to the nature of the protein in the potato flour unless a texture enhancing agent is used. Specifically, the '215 patent states (with emphasis added) in Col. 1, lines 16-36:

> Pasta products with satisfactory cooking quality and texture cannot be prepared by conventional methods using such vegetables [corn, potato, beans and peas] as the basic ingredients

[2] Cited in an Information Disclosure Statement filed concurrently with this Response.

> owing to the fact that the type and content of protein of these vegetables are different from that of semolina, durum flour, farina or regular wheat flour. For example, semolina and durum wheat contain from about 12-14% protein which is mostly gliadin and glutenin and which is believed to contribute to the pasta making quality while pea, bean and potato contain mostly globulin, and corn contains albumin and globulin. In addition, these vegetables can be classified into two groups, viz. low protein vegetables such as corn and potato containing from about 7-8% protein and high protein vegetables such as beans and peas containing from about 20-24% protein. Because of this difference in type and content of protein and also a different starch/protein ratio, the pasta-making quality of these vegetables is poor and they tend to break apart after cooking.

Likewise, the '470 patent states (with emphasis added) in Col. 1, lines 48-67:

> Pasta dough, prepared from the pasta flour, must exhibit a particular binding quality to prevent a breaking apart of the pasta during cooking and to provide a cooked pasta product of the proper texture. Wheat employed for conventional pasta inherently provided the required binding to the pasta dough. Heretofore, vegetable pasta products with satisfactory cooking quality and texture could not be prepared by conventional methods when no or substantially no wheat flours were added. U.S. Pat. No. 4,517,215 of Hsu observed that this was apparently due to the difference in the type and quantity of protein in the vegetables employed as compared to semolina, durum flour or regular wheat flour. Semolina and durum wheat contain about 12-14% protein which is mostly gliadin and glutenin and which was believed to contribute to the pasta cooking and texture qualities. Most of the protein in pea, bean and potato is globulin, while corn contains albumin and globulin. Further, vegetables, such as corn and potato, can be classified as being of low protein content, i.e., 7-8%, while bean and peas are considered high protein vegetables, i.e., 20-24%. Since vegetables have a different

> type and quantity of protein as compared to the wheat flour employed in pasta, vegetable pastas are of poor quality and tend to break apart after cooking.

As further disclosed in the '215 patent, Examples F to J illustrate the ability to form pasta from potato proteins (Col. 4, lines 11-46). However, only sample J formed a firm pasta, but such sample included significant amounts of propylene glycol alginate, which is a texture enhancing agent. The '470 patent, on the other hand, uses urad legumes as the vegetable flour, which is high in proteins. (Col. 2, line 67 to Col. 3, line 1).

As understood by one skilled in the art, when comparing pasta formed from potato flour to pasta formed from wheat flour, it is generally not the amount, but the type of protein that should be considered. As generally disclosed in the '215 and '470 patents, protein from wheat is made up of the gluten proteins glutenin and gliadin. Potato flour, on the other hand, is made up of the tuber protein patatin (*i.e.*, a globulin class of proteins). Such protein types are not simple substitutes of each other because they do not react the same during processing. The major difference is that the gluten protein amino acid composition in wheat flour is totally different from the amino acid composition of the patatin protein in potato flour.

As understood by one of ordinary skill, when water is added to wheat flour to make a pasta dough, the gluten protein gives the dough viscoelasticity, internal structure, cohesiveness, and ability to hold gas generated kneading or proofing so that the dough can form the desired textural firmness under the right circumstances. When water is added to potato flour to make a dough, the patatin proteins cannot form a viscoelastic and cohesive dough mass. It is generally understood that patatin

is hygroscopic, which allows the potato flour pasta to cook-up much faster, but also forms a much softer noodle that does not exhibit the texture of hard wheat/Semolina flour.

III. Kaufmann's Disclosure Of Complete Starch Gelatinization Of A Potato Flour Is Not A Disclosure Of A Texturally Firm Pasta After Cooking

As understood by the Applicants, the Office Action is relying on the passage in Kaufmann that the formed potato flour products have "an elastically yieldable character which may be attributed to the gelatinization of the starch through the cut strands or grains" to suggest that Kaufmann's method would produce a texturally firm pasta after cooking. (Office Action, page 2, citing Kaufmann Col. 2, lines 32-35.) As explained earlier in Kaufmann, "[t]he cut strands of dough pressed out through the die 10 are gelatinized not only on their surface but throughout there body." (Kaufmann, Col. 2, lines 23-25, emphasis added.)

However, the Applicants also believe the Examiner may be misunderstanding the effect of gelatinization of the starch in Kaufmann's method using a potato flour. Without gluten proteins, starch gelatinization of a potato flour would not produce a texturally firm pasta after cooking. Because potato flour does not include gluten proteins, the complete (*i.e.*, "throughout their body") gelatinization of the potato flour in Kaufmann actually forms a product without internal cohesiveness and completely opposite that claimed—a soft and mushy pasta (after cooking). This

is consistent with the prior art patents US 4,517,215[3] and US 5,087,470[4] discussed above.

The Applicants also wish to note the claims are directed to a pasta texture after cooking. Kaufmann's disclosure of an "elastically yieldable character" is in an "uncooked state" and, therefore, completely irrelevant to the textural firmness of a cooked pasta. (*See* Col. 2, line31-35.) The Office Action has completely ignored this distinction. The elastically yieldable character of an uncooked potato flour pasta as described by Kaufmann is consistent with a product that would yield, after cooking, a soft and mushy noodle.

IV. One Of Ordinary Skill At The Time Of Applicants' Invention Would Not Substitute Wheat Flour For Kaufmann's Potato Flour

As understood by Applicant, the Office Action is suggesting that one of ordinary skill in the art would look to the tabular list of ingredients in Bowes, note that wheat flour and potato flour have similar protein levels, and then conclude that wheat flour and potato flour are equivalent. Such analysis ignores the basic compositional make-up of these ingredients.[5] Simply because two food ingredients

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[3] "Because of this difference in type and content of protein and also a different starch/protein ratio, the pasta-making quality of these vegetables is poor and they tend to break apart after cooking." (Col. 1, lines 31-34.)

[4] "Since vegetable have a different type and quantity of protein as compared to wheat flour employed in pasta, vegetable pastas are of poor quality and tend to break apart after cooking." (Col. 1, lines 64-68.)

[5] This argument by the Examiner would support one looking at an apple and orange, noting they are fruits, and concluding they must be equivalent. Bowes, cited by the Examiner, merely lists the food values of portions (probably single serving or equivalent) of food ingredients. Although the Examiner

have similar levels of protein does not lead one of skill in the art to conclude that they are equivalent, even if the proteins are of similar type (which they are not in the present case) since each food ingredient may, and could, have different components that may, and could, change all kinds of functional characteristics.

Due to the fundamental distinctions between wheat and potato flour discussed above, especially as these distinctions relate to the type of proteins each contains, and the previously known effects on drying low protein wheat-like flour discussed below, there is no reasonable expectation of success in the cited prior art that wheat flour would be a reasonable substitute for potato flour in Kaufmann's method, much less form a texturally firm pasta. One of ordinary skill uses potato flour to make quick cooking and soft noodles, while wheat flours are used to make conventional pasta because the presence of gluten can form the desired texture after cooking under the appropriate circumstances.

V. The Prior Art Of Record Discloses That One Of Ordinary Skill In The Art At The Time Of Applicants' Invention Would Expect High Temperature Drying To Have Little Or No Effect On Pasta Texture After Cooking.

Applicant is not aware of any prior art reference disclosing methods of forming texturally-firm, low-protein wheat pasta by increasing both temperature and relative humidity during a drying step. The prior art of record actually teaches

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has only provided two pages of Bowes, it is likely that many ingredients listed in Bowes would have protein levels of about 8 percent. Similar protein levels would not make ingredients equivalent. Nor does the Bowes reference itself suggest such a use of its data; Bowes merely provides typical food values for common foods, nothing more. Indeed, potato flour has about 8.0 percent protein (page 149) and Shake 'n Bake (original recipe for pork; page 150) has about 9.0 percent protein. It is unlikely that one of ordinary skill would consider Shake 'n Bake an equivalent flour in pasta manufacture based on protein content.

drying temperature has little or no effect on the textural firmness (after cooking) of a soft-wheat-like pasta. Therefore, even if low protein wheat flour and potato flour could be simple substitutes for each other, the prior art teaches away from using drying conditions to improve the texture of cooked pasta when no texture enhancing agents are used.

For example, the publication Marconi et al, "Spelt (*Tricum spelta L.*) Pasta Quality: Combined Effect of Flour Properties and Drying Conditions", Cereal Chemistry , 2002, Vol. 79, No. 5, pages 634-639 ("Marconi")[6] discloses that varying drying temperature has little or no effect on the textural quality of pasta. Indeed, this reference specifically discloses that soft-wheat-like low protein dough cannot be formed into a pasta with textural characteristics achieved with Semolina flour by increasing the drying temperatures. In Marconi, the low protein flours had about 11.4 to about 11.6 percent protein.[7]

In particular, table V of Marconi on page 638 (shown below with added highlighting) discloses that low protein spelt flour (*i.e.*, Redoute LP, Rouquin LP, or HGQ Rouquin LP)[8] processed at high temperatures (about 40 to about 90°C)[9] formed a pasta with only "sufficient" and "insufficient" textural firmness as compared to the

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[6] Cited in the Information Disclosure Statement dated June 28, 2005.

[7] *Id.* at 636 (Table II). Note: The low protein flour had both similar levels of protein as well as the same type of protein (i.e., gluten). If they had different types of proteins, this comparison would be meaningless.

[8] Marconi considers spelt flour to have characteristics similar to soft wheat ("The common way of consuming spelt is as bread and baking products because it is a hexaploid wheat (42 chromosomes) with rheological and technological properties close to those of soft wheat) (Marconi at page 634.)

[9] Marconi at page 635.

traditional high protein Semolina wheat flour, which formed a pasta having "good" and "very good" textural firmness. In other words, drying temperatures did not produce a low-protein wheat-like pasta (after cooking) having a textural firmness of a Semolina flour pasta.

TABLE V
Cooking Quality of Spelt and Durum Wheat Pasta Processed at High Temperature (HT) and Low Temperature (LT) Drying

	Organoleptic Judgement								TOM (g starch/ 100 g dry pasta)	
	Firmness		Stickiness		Bulkiness		Total Score			
Sample[a]	HT	LT	HT	LT	HT	LT	HT	LT	HT	LT
Spelt										
Redoute LP	Insufficient	Rare	Rare	Very high	Rare	Very high	53	20	1.6	3.0
Redoute HP	Sufficient	Rare	Almost absent	High	Rare	High	67	33	1.2	2.7
Rouquin LP	Sufficient	Rare	Rare	Very high	High	Very high	53	20	1.8	3.0
Rouquin HP	Sufficient	Insufficient	Almost absent	High	Rare	High	67	40	1.2	2.7
HGQ Rouquin LP	Sufficient	Insufficient	Almost absent	Rare	Rare	Rare	67	53	1.5	2.3
HGQ Rouquin HP	Good	Sufficient	Absent	Rare	Almost absent	Rare	87	60	1.0	2.0
Mean[b]							66a	38b	1.4a	2.6b
Durum wheat										
Semolina LP	Good	Good	Absent	Almost absent	Almost absent	Rare	87	73	1.1	1.4
Semolina HP	Very good	Very good	Absent	Absent	Absent	Almost absent	100	93	1.1	1.1
Mean[b]							94a	83a	1.1a	1.3a

[a] HP = High protein; LP = low protein; HGQ = high gluten quality.
[b] Different letters between means within a row indicate statistically significant differences at $P \leq 0.01$.

As such, one of ordinary skill in the art at the time of Applicants' invention would not expect an Semolina-like pasta quality by from low protein wheat flours simply by increasing the drying temperature, much less increasing both the drying temperatures and drying relative humidity. As discussed further below, The Office Action has provided no reasoned explanation why a vague reference in Kaufmann to varying processing conditions and the tabular list of ingredients in Bowes would suggest to one of ordinary skill to increase both temperature and relative humidity to improve textural firmness (after cooking) of a low protein wheat flour pasta. This assertion based on Kaufmann's vague generalization is especially deficient when the Marconi reference provides clear evidence to the contrary.

VI. Even If References Were Combined As Proposed, The Combination Of Kaufmann, Bowes, and/or Flessner Fails to Disclose Drying Temperatures and Relative Humidity Effective to Form The Claimed Textural Firmness

As suggested above, the Office Action is making unsupported assertions based on vague references in Kaufmann that one of ordinary skill would expect that varying processing conditions in Kaufmann's method would lead to a texturally firm pasta. (Office Action, page 3.) In particular, the Office Action states

> [s]ince Kaufmann teaches that 'depending on particular properties of the starchy flours of low protein employed, . . . the processing temperature applied thereto may be adapted to the various needs", it would have been obvious to one of ordinary skill in the art to modify drying temperature and humidity as claimed depending on the particular type of low protein flours used."

(Office Action, page 3 citing Kaufmann, Col. 2, lines 37-41.) However, reliance on such vague disclosure in Kaufmann carries little weight—and certainly does not suggest a reasonable expectation of success—when compared to the specific teachings and specific data in the Marconi reference that teach exactly the opposite.

As discussed in detail in Section V above, the prior art reference to Marconi contradicts the Office Action's assertion and plainly supports the opposite conclusion—based on the art of record, the expected results of increasing drying temperatures would not form a low protein flour dough into a pasta with acceptable textural firmness. On top all this, the Office Action has provided no support that the combination of selected temperature and relative humidity ranges would provide the improved results that Marconi failed to achieve.

Bowes does not overcome this deficiency. Bowes is only a list of ingredients with compositional amounts and, therefore, provides no relevant disclosures on drying temperature or relative humidity.

The English language translation of Flessner also does not overcome the deficiencies of Kaufmann or Bowes. As stated in a previous response, Flessner actually teaches away from the claimed method and pasta. Flessner ONLY discloses the use of significant amounts of texture enhancing agents with soft wheat flours and provides no disclosure that the method can be used without such additives.[10] In other words, all Flessner discloses is that, at the time of Applicants' invention, one of ordinary skill would need to use texture enhancing agents with low-protein soft wheat flour to achieve textural firm pasta and provides no disclosure that a firm pasta could be made without such additives. As a reference must be considered as a whole, the Office Action is ignoring that Flessner's method requires texture enhancing agents.

[10] As discussed in the previous response, the formulation of Flessner includes 2 to 5 parts (3-5%) of salt (sodium chloride) and 1 to 2.5 parts (1.5-2.8%) of an emulsifying agent (glycerol monostearate). Both of these ingredients are texture enhancing agents as defined by Applicants' specification and are clearly in "significant amounts" as also defined by Applicants' specification (*see* page 9, lines 18-31).

VII. Conclusion

Reconsideration and allowance of claims 1-23 are respectfully requested. The Commissioner is hereby authorized to charge any additional fees which may be required with respect to this communication, or credit any overpayment, to Deposit Account No. 06-1135.

Respectfully submitted,

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